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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,379	12/18/2001	Michael R. Sogard	PA0335-US/11269.34	1089

7590 08/08/2003

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EXAMINER
SOUW, BERNARD E

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 08/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/026,379	SOGARD, MICHAEL R.	
	Examiner	Art Unit	
	Bernard E Souw	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *49-76 and 124-208* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *49-76 and 124-208* is/are rejected.

7)☒ Claim(s) *70,72,186,187,203 and 204* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 April 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *04/28/2003)* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *6* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Amendments

1. The Amendment A, Paper No. 8/A, filed on 05/07/2003, has been entered.

Claims 1-48 and 77-123 have been cancelled.

Claims 70 and 72 have been amended.

New claims 144-208 have been added.

Pending in this Office Action are claims 49-76 and 124-208.

The present Office Action is made with all the suggested amendments being fully considered.

Drawings Amendment

2. The drawings amendment of Figures 1B and 2 proposed with the Amendment A filed on 05/07/2003 (paper no. 8/A) is approved by the Examiner.

Withdrawal of previous 35 USC § 112Rejections

3. Claims 1-48 and 77-123 having been cancelled, the previous rejections of claims 8, 10, 39, 41, 70, 72, 84, 86, 114 and 116 under 35 U.S.C. 112, second paragraph are automatically withdrawn.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

► Claims 70 and 72 (Amended) recite the limitation "*whereas the magnitude of the beamlets that is **directed** toward the mask is compared with the magnitude of the signal measured by the detector assembly to inspect the mask*". It is unclear to one of ordinary skill in the art, how the first measurement (*the magnitude of the beamlets that is **directed** toward the mask*) is measured. Unlike the signal measured by the detector assembly (180 in Fig.1A and 1B), this "*magnitude of the beamlets that is **directed** toward the mask*" is not available to measurement, since any measurement will inevitably annihilate the signal to be detected by the detector assembly, unless the comparison is accomplished using a two-step measurement in sequence, i.e., the first one measuring the *magnitude of the beamlets that is **directed** toward the mask 101*, say I_0, and the second one measuring *the magnitude of the signal by the detector assembly 180 (Fig.1B), the latter consisting of a signal transmitted through the mask measured by the first detector 182, I_T, another signal forwardly scattered by the mask measured by the second detector 184, I_S, and yet another signal reflected off by the mask measured by the third detector 106, I_R, the latter being explicitly recited in claim 71.*

► Claims 186, 187, 203 and 204 (New claims) recite similar limitations as that of claims 70 & 72 objected previously. Hence, new claims 186, 187, 203 and 204 are also objected under the second paragraph of 35 U.S.C. 112, as already applied to claims 70 and 72.

► To proceed with this examination, it is assumed that mask inspection is accomplished by comparing I_0 with I_T, I_S and I_R, or just by comparing I_T, I_S and I_R with each other, as generally known to one of ordinary skill in the art.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 49-51, 67, 68 and 124-126 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Kobinata and Muraki et al., and further in view of Itoh et al. (USPAT 5,438,207), or Shimura et al. (USPAT 4,524,277), or Yasaka et al. (JP-405090140A).

Regarding claim 49, Nakasuji describes a mask inspection system, comprising

- a source of electrons 1 shown in Fig.1, as recited in Col.8/ll.19-22;
- a stage 79 supporting the mask 75 shown in Fig.11, as recited in Col.21/ll.13-17;
- a beamlet shaping section 3 shown in Fig.1, recited in Col.8/ll.24-34 or aperture 71/71a shown in Fig.11, recited in Col.21/ll.3-11, disposed between the electron source 1 in Fig.1 but not shown in Fig.11 (upstream from electron beam EB) and the mask 75, as recited in Col.21/ll.13-17, the beamlet shaping section including a (first) multi-aperture array 71 having apertures 71a;

a first electron lens group 2 directing electrons emitted from the source of electrons 1 into a collimated beam in an axial direction towards the (first) multi-aperture array 3, as shown in Fig.1 and recited in Col.8/ll.22-34;

- a second electron lens group 72 & 73 shown in Fig.11, as recited in Col.21/ll.12-13, or lens group 6 & 7 shown in Fig.1, as recited in Col.8/ll.39-41, directing each beamlet in the array towards the center of a corresponding aperture in the second multiple array;
- an electron deflector 15 in Fig.1 and 74 in Fig.11, as recited in Col.21/ll.30-36; and
- a detector assembly 81 & 83 that measures electrons to inspect the mask 75, as recited in Col.21/ll.47-65.

However, Nakasuji's device does not make use of a first and second multi-aperture arrays having apertures with a first and second shape, respectively. The use of (at least) two multi-aperture arrays is taught by Itoh et al. in numerals 112 and 116 shown in Fig.1 and Fig.2, as recited in Col.1/ll.56-68 and Col.5/ll.62, respectively. It is also taught by Shimura et al. in apertures 6 and 10 shown in Fig.1, as recited in Col.2/ll.50-68 and Col.3/ll.1-6, and further, by Yasaka et al. in apertures P1 and P2 shown in Fig.1 & 3, as recited in the Constitution section, lines 3-7.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nakasuji's one aperture array with two multi-aperture arrays, in order to generate an electron beam of variable shapes determined by the intersection of the two apertures, as taught by Itoh et al., Shimura et al., or Yasaka et al.

However, Nakasuji's device and method do not make use of a beamlet blanking section disposed between the beamlet shaping section and the mask. Kobinata discloses a mask inspecting device and method as shown in Fig.2 and recited in the title and Abstract. As recited in Col.5/ll.18-32 and Col.6/ll.33-38, Kobinata's device and method make use of a blanking aperture 15 shown in Fig.2 and Fig.3, disposed between the mask M and the electron source 11, the latter being modified by Nakasuji's beamlet shaping section 71. In addition to Nakasuji's, the step of measuring electrons by a detector assembly under a sequential superposition of electron beamlets forming a variable-shaped exposure beam is taught by Kobinata in Col.7/ll.66-67 and Col.8/ll.1-4.

► Regarding claim 67, Kobinata's electron source is specifically denoted as an "electron gun" as shown in numeral 11 in Fig.1. As known in the art, electron gun can be used to generate a multiple array of beamlets, if appropriate electron optics and apertures are being used.

Alternatively, Muraki et al. disclose an electron beam exposure apparatus and method that can be used for inspecting Nakasuji's mask by replacing Muraki's wafer 5 shown in Fig.1 by Nakasuji's mask 75 or Kobinata's mask M. As shown in Fig.1, Muraki's device and method make use of a blanking aperture BA disposed between the beamlet shaping section 3 and the mask 5.

► Specifically regarding claim 68, the limitation that the MxN aperture array corresponds to the (first) multi-blanking aperture array is trivial, since otherwise the blanking aperture array will not be able to function properly.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nakasuji's mask inspecting apparatus by adding a blanking aperture as taught by Kobinata or Muraki et al., since such a blanking aperture would enable one of ordinary skill in the art to compose a variable shape electron beam of any desired form based on a superposition of differently shaped electron beams in timely sequential order, here accomplished by blanking (i.e., deflecting away) the electron beam during every change of shape.

Further, Muraki et al. make use of a first electron lens group 2 shown in Fig.1 to direct electrons from the source 1 into a collimated beam in an axial direction AX towards the first multi-aperture array 3, the latter being here modified by Nakasuji's beam shaper 71 according to Muraki's teaching in Col.6/ll.61-64 regarding the equivalence between crossover image and electron source. Muraki's modification of Nakasuji's device and method also make use of a second electron lens group 41 to direct each beamlet formed by the first multi-aperture array 3 (implicated in Col.7/ll.8-13) towards the center of Itoh's or Shimura's or Yasaka's second aperture (as modified by Nakasuji into a multi-aperture array) placed at Muraki's cross-over image shown Fig.1 between lens 43 and lens 44.

Muraki's modification of Nakasuji's device and method further make use of an electron deflector 6 disposed between the first multi-aperture array 3 and the second multi-aperture array placed at Muraki's cross-over image between lens 43 and lens 44.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to dispose Muraki's electron deflector 6 between the first multi-aperture array 3 and the second multi-aperture array at Muraki's crossover image between lens 43 and lens 44, as modified above by Nakasuji into a second multi-aperture array, since this arrangement is conventional in the art, as disclosed by Itoh et al. in electron deflector 114 disposed between first aperture 112 and second aperture 116, both apertures having been modified from single apertures to multiple aperture arrays according to Nakasuji's teaching.

► Specifically regarding claim 124, Nakasuji's beamlet shaping section comprises a multi-aperture array having M rows and N columns, as shown in Fig.12 and recited in Col.21/ll.7-10.

► Regarding claims 50 and 125, Muraki's aperture BA in Fig.1 may be formed as an active blanking aperture array having M rows and N columns, as implicated in Col.9/ll.8-11 by analogy to previously recited electron beamlets 305 and 306 shown in Fig.3 and recited in Col.9/1-8. Alternatively, Muraki's aperture BA is modified by general knowledge in the art into a multiple blanking aperture in order to match the first multi-aperture array of Nakasuji's.

► Regarding claim 51, Nakasuji's as modified by Muraki's blanking aperture array BA in Muraki's Fig.1 may be alternatively switched in position with the second multi-aperture array of claim 49 or 124 at the crossover image between lens 43 and lens 44, without any effect on the function of the electron exposure device, as generally known in the art. Under this alternative arrangement, Muraki's modification of Nakasuji's device & method further make use of a third electron lens group 43 to direct each beamlet having selected shapes towards a corresponding aperture in the blanking aperture array, now placed between 43 and 44.

The limitations of a logic circuit associated with the blanking aperture and a contrast aperture to absorb unwanted electrons and x-rays are both conventional and well known in the art, and hence, unpatentable.

Nakasuji's as modified by Kobinata's and Muraki's further makes use of a fourth electron lens group 44 to focus the electron beamlets passing undeflected through the blanking aperture array (located between lens 43 and 44) onto the mask 5 (modifying Nakasuji's multi-aperture array 75 of Fig.11.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to switch Muraki's blanking aperture array BA in Fig.1 with the second multi-aperture array at the crossover image between lens 43 and lens 44, since it has been held that a mere reversal of the essential working parts of a device without producing any novel or unexpected results involves only routine skill in the art. *In re Einstein*, 8 USPQ 167.

► Regarding claim 69, Nakasuji's detection apparatus and method make use of a detector assembly 81+83 that measures the magnitude of the signal that passes through at least a portion of the mask 75, as shown in Fig.11 and recited in Col.21/ll.25-67 and Col.22/ll.1-25.

► Regarding claims 70-72, Muraki et al. discloses an electron beam exposure system and method making use of the magnitude of signal reflected off of an object 5 shown in Fig.1 (here Muraki's object 5 is substituted by Nakasuji's mask), in which the reflected signal detected by electron detector 9 is compared to that measured by detector 10, as recited in Col.7/ll.50-65.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to measure the electrons reflected off from Nakasuji's mask, as taught by Muraki et al., in addition to those measured by Nakasuji's detector assembly 81+83, since a comparison of the two signals would enhance the accuracy of detecting a mask defect.

One would have been motivated for using Muraki's reflected electron data to enhance the accuracy of Nakasuji's defect detection method, since it is generally well known in the art that the accuracy of a measurement can be enhanced by considering more independently measured data. This motivation is generally derived by common sense from general knowledge in the art, without a need to be taught by any prior art.

► Claims 73-76 and 140-143 are various types of claims, such as product by process, apparatus for process and object for process claims, reciting limitations which are directly or indirectly dependent to, while being fully covered in its entirety without a single exception by the limitations of the parent apparatus claim 49 and the method claim 124, respectively. Claims 73-76 and 140-143 are therefore rejected along with claims 49 and 124.

7. Claims 52-66 (device claims) and 127-139 (method claims) are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Kobinata and Muraki et al., and Itoh et al., or Shimura et al., or Yasaka et al., as previously applied to the respective parent claims 49, 51 and 126, *and in further view of Sogard et al. (USPAT # 6,014,200)*.

► Claims 52, 54, 56, 58 (device claims) and 127, 129, 131, 133 (method claims) are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Kobinata and Muraki et al., and further in view of Itoh et al., or Shimura et al., or Yasaka et al., as previously applied to the respective parent claims 51 and 126, except for the recitation of a first and second blanking aperture *shields* having M rows and N columns of apertures corresponding to the apertures in the first and second active blanking aperture arrays.

Sogard et al. disclose a multi-aperture/column electron beam exposure system, comprising a first and second aperture *shields* ((118 and shown in Fig.1) having M rows

and N columns of apertures corresponding to the apertures in the first and second active blanking aperture arrays, the first blanking aperture *shield* being disposed between the second multi-aperture array and the (first) active blanking aperture array, and the second blanking aperture *shield* being disposed between the (second) blanking aperture array and the object to be exposed, as recited by Sogard et al. in the Abstract/ll.10-11, reciting a blanking aperture as active multi-aperture array, in Col.3/ll.20-27 reciting the need to protect the blanking apertures, in Col.4/ll.17-23 reciting the first shield protecting the first active or blanking multi-aperture array, in Col.4/ll.24-30 reciting the second shield protecting the second active or blanking multi-aperture array, and Col.6/ll.65-67 & Col.7/ll.1-16, and for a different embodiment in Col.11/ll.1-16 reciting a first shield 118 shown in Fig.6B, and in Col.11/ll.27-67 & Col.12/ll.1-11 reciting a second shield 130 shown in Fig.7A-C and Fig.8.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adopt Sogard's multi-aperture shield(s) for protecting the active multi-aperture blanking sections, in order to prevent heat from being deposited into the multi-aperture array(s) which might cause the latter to warp, as recited by Sogard et al. in Col.7/ll.11-16, and further, in Col.4/ll.50-52 and Col.12/ll.3-11.

► Claims 53, 55, 57, 59, 128, 130, 132 and 134 are also rejected for reciting limitations that are generally known to one of ordinary skill in the art.

It is generally known in the art that low atomic number materials are poor x-ray scatterers, whereas high atomic number materials are strong x-ray scatterers. To make

an x-ray scattering mask using both low and high atomic number materials is therefore conventional and also well known in the art, as implicated by Sogard et al. in Col.11/ll.11-15.

► Regarding claims 60 and 135, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use at least one x-ray baffle in order to prevent unwanted x-ray generated in the aperture materials by high energy electrons from producing secondary electrons that may reach the electron detectors and falsify the measurement data.

► Regarding claims 61 and 136, it would have been obvious to one of ordinary skill in the art at the time the invention was made to dispose the x-ray baffle between the second multi-aperture array and the active blanking aperture array, since it is just the conventional position that would render the baffle function most effective, as generally known in the art.

► Claim 62 recites specific limitations regarding the fourth electron lens group being constructed of first and second symmetric magnetic doublets, the limitations being conventional as also well known in the art, and hence, unpatentable. Further limitations of their relative locations is -- apart from the design being uncritical -- also conventional and well known in the art, and hence, unpatentable.

► Claims 63 and 65 recite limitations that are uncritical, and furthermore, are mere matters of design choice. As such, claims 63 and 65 are both unpatentable.

► Claim 64 recites limitations which consist of a combination of claims 49 and 63. Claim 64 is therefore unpatentable by the same token as previously applied to claims 49 and 63.

► Claim 66 recites a memory unit for storing a next pattern logic, which is conventional, and hence, unpatentable.

► Claim 126 is a method claim version of claim 51. Consequently, claim 126 is also rejected along with claim 51.

► Claim 137 is a method claim version of claim 62, and hence, is unpatentable by the same token.

► Claim 138 is a method claim version of claim 63, and hence, is unpatentable by the same token.

► Claim 139 is a method claim version of claim 66, and hence, is unpatentable by the same token.

R sponse to Applicant's Argum nts

15. Applicant's arguments filed on 05/07/2003 (paper no.8/A) have been fully considered but they are not persuasive. The following is Examiner's response to Applicant's arguments.

Regarding claims 49-76 and 124-143, it is noted that ***none*** of the argued features are recited in the claims, i.e., regarding "*triangle, rectangle and hexagon shaped beamlet cross-sections*" (paper no.8/A, page 29, lines 1-6 from bottom), as well as regarding "*easy change between a first shape and a second shape different from the first shape*" and "*different shapes for the spaced apart beamlets*" (paper no.8/A, page 30, lines 1-6).

Applicant is obviously arguing limitations which are not claimed. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In consequence, claims 49-76 and 124-143 stand rejected under 35 U.S.C. 103(a) under the same reasons and over the same prior arts as already applied in the previous Office Action.

Rejection of New Claims

8. New claims 193 and 196-208 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Kobinata and Muraki et al., and further in view of Itoh et al. or Shimura et al. or Yasaka et al., and Yamada et al. (USPAT # 6,137,111)

► Claim 193 recites the same limitations as the previously rejected claim 124 plus some additional limitations that are also rejected over the same prior arts as follows:

Nakasuji's mask to be inspected (mask 75 in Fig.11) has a plurality of desired transparent pattern 75b and a plurality of desired opaque areas 75a organized in a desired opaque pattern, the mask 75 including a plurality of actual transparent areas 75b and a plurality of actual opaque areas 75a, as shown in Fig.11 and recited in Col.21/ll.17-23.

- As already applied to the rejection of claim 124 above, the use of (at least) two multi-aperture arrays is taught by Itoh et al. as well as by Shimura et al., and further, by Yasaka et al..
- The use of a control section that adjusts the positions of the first and second multi-aperture arrays so that the shape of the beamlets can be easily changed between a first shape and a second shape different than the first shape is conventional and well known in the art, for being the main and common purpose of using two (or more) multi-aperture arrays. This Official Notice is supported, e.g., by Itoh et al. as recited in Col.1/ll.51-52 in reference to using two multi-aperture arrays recited in Col.1/ll.58-68, by Yasaka et al., in reference to a general purpose shape in the Abstract 3-10, and further, by Shimura et al., as recited in Col.2/ll.62-67 and Col.3/ll.5-24.

Although Itoh et al., Yasaka et al. and Shimura et al. use their inventions for photolithographic patterning of a wafer, it is generally known in the art that they are essentially no different than the general purpose electron beam exposure device &

method. As such, they can be also used for mask inspections, as recited by Yamada et al. (USPAT # 6,137,111) in the Abstract/ll.1-7 (for detecting mask deficiency or defect) and in Col.1/ll.11-17 (for forming a pattern on a wafer).

► Regarding claims 196-198, the additional limitation that the plurality of spaced apart beamlets is simultaneously directed towards the mask is recited by Nakasuji et al. in the Abstract/ll.5-8 & Col.2/ll.37-42, and is also inherent in Muraki's, as recited in the Abstract/ll.9-15

Still regarding claims 196-198, the use of more than one (ten to one thousand or even ten thousands or more) shaped beamlets is inherent in Nakasuji's, Muraki's and Yamada's. To further increase the number of beamlets is a mere duplication of parts that does not produce any new or unexpected result, and furthermore, only involves routine skill in the art. Hence, claims 196-198 are unpatentable.

► Regarding claims 199-202 the recitations of various similarities in pattern, cross-sectional size and shape between the beamlets and at least a portion of the (desired, or inspected) patterns, are rendered obvious by Yamada et al. in the Abstract/ll.7-19.

► Regarding claims 203 and 204, the limitation of inspecting the mask by comparing the magnitudes of the signal measured by the detector assembly, I_0, with the signal of the beamlet that is directed toward the mask (I_T, I_S and I_R), or just by comparing I_T, I_S and I_R with each other (see § 112 rejection/objection above), is

conventional and also generally known to one of ordinary skill in the art, as already brought up in the § 112 rejection/objection above.

► Claims 205-208 are various types of claims, such as product by process, apparatus for process and object for process claims, reciting limitations which are directly or indirectly dependent to, while being fully covered in its entirety without a single exception by the limitations of the parent claim 193. Claims 205-208 are therefore rejected along with claim 193.

9. New claims 144-192 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakasuji in view of Kobinata and Muraki et al. in view of Itoh et al. or Shimura et al. or Yasaka et al., and in further view of Yamada et al. and Sogard et al. (USPAT # 6,014,200).

Nakasuji in view of Kobinata and Muraki et al. in view of Itoh et al. or Shimura et al. or Yasaka et al., and further in view of Yamada et al. show all the limitations of claims 144-192 as previously applied to claims 196-208, except the recitations of a beamlet cross-section shaped as a triangle (claims 144-160) and a hexagon (claims 161-176), and further, a deflector to deflect the shaped beamlets to fill-in the spaces between adjacent shaped beamlets to substantially complete (one of) the desired patterns (claim 177-192).

► Regarding claim 144, the limitation of a beamlet cross-section shaped of at least a triangle is disclosed by Sogard et al. in Fig.5C through Fig.5F, and a rectangle in Fig.5G to Fig.5I, as recited in Col.9/ll.31-67 & Col.10/ll.1-5.

► Regarding claim 161, the limitation of a first multi-aperture array of a first shape having its first section substantially shaped as a hexagon, is disclosed by Sogard et al. in Fig.5A, showing a section of the first shape 502 as being a hexagon, as recited in Col.9/ll.31-36 and further emphasized in Col.9/ll.43-45.

► Regarding claim 177, the limitation of a deflector to deflect the shaped beamlets to fill-in the spaces between adjacent shaped beamlets to substantially complete (one of) the desired patterns, is disclosed by Sogard et al. in Col.4/ll.1-8 and Col.16/ll.52-54.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adopt Sogard's lithographic patterning beamlet shapes (claims 144 & 161) and beamlets aerial occupation (claim 177) to modify the mask inspection apparatus and method of Nakasuji's previously modified by Kobinata, Muraki et al., Yamada et al. and Itoh et al. or Shimura et al. or Yasaka et al., since both lithographic patterning and mask inspection are based on electron beam exposure apparatus and method, as already suggested with regard to the rejection of claim 193 above.

► Claims 162-164, 178, 194 and 195 recite the same limitations of a beamlet cross-sectional shape of a triangle and/or rectangle as recited in claim 144. therefore, claims 162-164, 178, 194 and 195 are rejected for the same reason and over the same prior arts as claim 144.

► Claims 145, 146, 155, 156, 167-170, 183 and 185 recites various similarities in pattern, cross-sectional size and shape between the beamlets and at least a portion of the (desired, or inspected) patterns, the same limitations as those of rejected claims 199-202 that have been previously rendered obvious by Yamada et al. in the Abstract/ll.7-19. Claims 145, 146, 155, 156, 167-170, 183 and 185 are therefore are rejected for the same reason and over the same prior arts as claims 199-202.

► Regarding claim 147, the limitation of a cross-sectional size of at least 50 percent of the size of the desired areas is not critical, although it is well known in the art as being uncritically limited by the heat dissipated by electron beam stopped and deposited in the opaque areas, as indicated by Sogard et al. in Col.12/ll.12-60 and can be estimated from Fig.5C through Fig.5I.

► Claims 148, 171, 186 recite the same limitations as the previously rejected claim 203, whereas claims 149, 172 and 187 recite the same limitations as the previously rejected claim 204. Therefore, claims 148, 149, 171, 172, 186 and 187 are rejected for the same reason and over the same prior arts as claims 203 and 204.

► Claims 150-154, 165, 166 and 179-181 recite the same limitations as the previously rejected claims 196-198, wherein the recitation of ten, one hundred, one thousand, or ten thousand beamlets is mere duplication of parts that does not produce

any new or unexpected result, and furthermore, only involves routine skills in the art. Hence, claims 150-154, 165, 166 and 179-181 are unpatentable along with the previously rejected claims 196-198.

► Claims 157-160, 173-176 and 189-192 are various types of claims, such as product by process, apparatus for process and object for process claims, reciting limitations which are directly or indirectly dependent to, while being fully covered in its entirety without a single exception by the limitations of the parent claims 144, 161 and 177, respectively. Claims 157-160, 173-176 and 189-192 are therefore rejected along with their respective parent claims 144, 161 and 177.

► Claims 182 and 184 recite the same limitations as the previously rejected claims 199 and 201, respectively. Therefore, claims 182 and 184 are rejected for the same reasons over the same prior arts, however, with Sogard et al. as an additional prior art due to their dependency on claim 177.

► Claim 188 does not recite any limitation, since no limitation is actually claimed by the first multi-aperture and the second multi-aperture arrays, nor is there any limitation being claimed that the two apertures are different in shape. However, in anticipation that Applicant would amend claim 188 to recite that the two apertures are different in cross-section, size and/or shape, such a limitation is rendered obvious by Sogard et al. in Col.9/ll.31-67 & Col.10/ll.1-8.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard E Souw whose telephone number is 703 305 0149. The examiner can normally be reached on Monday thru Friday, 9:00 am to 5:00 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on 703 308 4116. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872 9318 for regular communications and 703 872 9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

bes
July 17, 2003

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